

SOLAR OBSERVATIONS.

SOLAR AND SKY RADIATION MEASUREMENTS DURING NOVEMBER, 1923.

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For a description of instruments and exposures, and on account of the method of obtaining and reducing the measurements, the reader is referred to this REVIEW for April, 1920, 48:225, and a note in the REVIEW for November, 1922, 50:595.

From Table 1 it is seen that solar-radiation intensities averaged slightly below normal values for November at Washington, D. C., and Lincoln, Nebr., and slightly above normal at Madison, Wis.

Table 2 shows a slight deficiency in the total radiation received on a horizontal surface at Washington and Madison, and a slight excess at Lincoln.

Skylight-polarization measurements obtained at Washington on 10 days give a mean of 60 per cent, with a maximum of 70 per cent on the 9th. These are slightly above average values for November at Washington. At Madison no measurements were obtained on account of the generally cloudy condition of the sky.

TABLE 1.—Solar radiation intensities during November, 1923.

[Gram-calories per minute per square centimeter of normal surface.]

Washington, D. C.

Date.		Sun's zenith distance.										Local mean solar time.	
		8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.8°		Noon.
		75th mer. time.	Airmass.										
			A. M.						P. M.				
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e.	
Nov. 1.....		mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
2.....		3.81	0.53	0.69	0.93	1.10	.....	1.25	1.05	0.98	0.88	4.95
3.....		3.63	.....	.....	0.64	.....	.....	1.31	1.14	0.95	0.86	5.36
4.....		4.57	0.77	0.89	1.03	1.08	.....	1.15	1.01	0.87	0.78	4.76
5.....		2.74	.....	.....	.....	.....	.....	1.31	1.14	0.95	0.86	2.36
6.....		3.63	0.52	0.63	0.78	1.04	.....	1.12	0.96	0.83	0.73	3.45
7.....		5.16	0.54	0.66	0.80	0.97	.....	.....	.....	.....	.....	6.02
8.....		4.95	.....	.....	1.25	.....	.....	1.14	1.03	0.82	0.75	5.16
9.....		4.17	0.92	1.07	1.19	1.36	1.59	1.35	1.09	0.92	0.78	3.30	
10.....		3.45	0.49	0.61	0.73	1.00	.....	1.06	0.83	0.65	0.52	3.63
11.....		5.79	.....	.....	0.73	.....	.....	.....	.....	.....	.....	8.18
12.....		6.76	.....	.....	.....	.....	.....	1.21	.....	.....	.....	4.75
Means.....		.....	0.63	0.76	0.85	1.11	.....	1.20	1.02	0.86	0.76	.....
Departures.....		.....	-0.11	-0.08	-0.15	-0.07	.....	+0.03	+0.04	+0.04	+0.03	.....

TABLE 1.—Solar radiation intensities during November, 1923—Con.

[Gram-calories per minute per square centimeter of normal surface.]

Madison, Wis.

Date.	Sun's zenith distance.											Noon.		
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.8°				
	75th mer. time.	Airmass.											Local mean solar time.	
		A. M.						P. M.						
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0			e.
Nov. 6.....	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.			
7.....	3.15	.....	.....	.....	.....	.....	.....	1.18	.....	.....	4.95
8.....	2.49	.....	.....	.....	.....	.....	.....	1.21	.....	.....	2.87
9.....	3.00	0.91	1.01	1.14	1.23	.....	.....	1.11	.....	.....	3.68
19.....	3.81	1.03	1.14	1.26	.....	.....	.....	.....	.....	.....	4.17
Means.....		(0.97)	(1.08)	(1.24)	(1.23)	.....	.....	1.17	.....	.....		
Departures.....		+0.10	+0.06	+0.04	-0.06	.....	.....	+0.00	.....	.....		

Lincoln, Nebr.

Nov. 5.....	3.30	1.05	1.17	1.29	1.42	1.59	1.41	1.22	1.09	1.04	3.00
6.....	2.87	0.80	0.90	1.04	1.19	.....	.....	.....	.....	.....	4.57
7.....	4.17	.....	.....	.....	.....	.....	1.34	.....	.....	0.81	3.81
8.....	3.81	.....	.....	1.07	1.27	.....	1.29	1.05	0.93	0.84	3.99
9.....	3.15	.....	.....	1.09	1.30	.....	.....	.....	.....	.....	5.16
10.....	4.57	.....	.....	.....	.....	.....	1.26	.....	.....	.....	5.36
11.....	4.95	.....	.....	1.15	1.33	1.53	1.37	1.23	.....	0.99	5.56
12.....	4.17	0.69	0.77	1.04	1.34	.....	.....	.....	.....	.....	4.75
13.....	3.63	.....	.....	.....	.....	.....	1.36	1.19	1.07	0.98	4.75
14.....	2.74	0.82	0.95	.....	.....	.....	.....	.....	.....	.....	3.63
15.....	4.17	.....	1.14	1.28	1.43	1.60	.....	.....	.....	.....	4.37
16.....	2.74	.....	1.20	1.31	1.46	.....	.....	.....	.....	.....	2.06
17.....	2.82	.....	1.03	1.16	.....	.....	.....	1.15	0.98	0.89	3.30
Means.....	.....	0.84	1.02	1.16	1.34	.....	1.34	1.17	1.02	0.92	.....
Departures.....	.....	-0.10	-0.03	-0.04	-0.02	.....	-0.03	-0.03	-0.03	-0.02	.....

1 Extrapolated.

TABLE 2.—Solar and sky radiation received on a horizontal surface.

Week beginning	Average daily radiation.				Average daily departure for the week.			Excess or deficiency since first of year.		
	Chicago.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.
Nov. 5.....	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
12.....	161	161	219	291	-66	+51	+63	-4,837	-795	-2,421
19.....	114	169	105	228	-36	-44	+14	-5,091	-1,103	-2,322
26.....	114	197	131	207	+12	-5	+5	-5,008	-1,138	-2,289
Means.....	58	166	82	206	-3	-44	+15	-5,030	-1,446	-2,151

WEATHER OF NORTH AMERICA AND ADJACENT OCEANS.

NORTH ATLANTIC OCEAN.

By F. A. YOUNG.

The average pressure for the month varied considerably, as compared with the normal, as shown by the departures at a number of selected land stations on the coast and islands of the North Atlantic.

The barometric readings are in inches, for 8 a. m. 75th meridian time, and the departures are approximate, as the normals were taken from the Pilot Chart and are based on Greenwich mean noon observations, corresponding to 7 a. m. 75th meridian time.

St. Johns, Newfoundland, mean 30.08 inches, departure, +0.04 inches; Nantucket, 30.06, -0.03; Hatteras, 30.07, -0.07; Key West, 30.05, +0.02; New Orleans, 30.13, +0.02; Swan Island, 29.91, -0.01; Turks Island,

30.03, +0.03; Bermuda, 29.98; -0.16; Horta, Azores, 30.19, +0.08; Lerwick, Shetland Islands, 29.57, -0.13; Valencia, Ireland, 29.86, -0.04; London, 29.78, -0.16.

The number of days on which winds of gale force were reported did not differ materially from the normal over the greater part of the ocean, although in the 5-degree square between the 40th and 45th parallels and the 55th and 60th meridians, where the maximum occurred, gales were observed on 8 days, which is considerably in excess of the percentage shown on the Pilot Chart. The number of disturbances in southern waters was also somewhat greater than usual.

According to reports received, fog was observed on 11 days in the vicinity of the Grand Banks, which is not far from the normal; it was reported on from 4 to 6 days over the middle section of the northern steamer

lanes, on from 2 to 4 days off the American coast, north of the 35th parallel, and was apparently rare off the coast of Europe.

From the 1st to 4th an area of high pressure was over New England and New York, and during that period moderate to strong northeasterly gales, with little shift of wind until near the end, were reported by a number of vessels in the region between the 25th and 40th parallels, west of the 60th meridian. This disturbance was a true "norther," due to the steep pressure gradient between the north and south, as in the Caribbean Sea the barometric readings were somewhat below normal. The weather map for the morning of November 2 shows that at New York and Portland, Me., the barometer read 30.62 inches and at Swan Island and Kingston, Jamaica, 29.90 inches. Storm logs:

American S. S. Esparta:

Gale began on the 1st, wind NE. Lowest barometer 30.13 inches at noon on the 1st, wind NE., 8, in latitude 33° 43' N., longitude 76° 30' W. End on the 3d, wind NE. Highest force of wind 8, NE.; steady NE.

American S. S. Mobile City:

Gale began on the 1st, wind NE. Lowest barometer 30.05 inches at 3 p. m. on the 1st, wind NE., 4, in latitude 26° 41' N., longitude 79° 54' W. End on the 2d, wind variable. Highest force of wind 8, NE.; shift 4 points. At time of lowest barometer wind shifted from N. to NE., and increased in force from 2 to 5, then gradually getting stronger until a force of 8 was reached. Meanwhile the barometer rose from 30.05 to 30.23 inches where it stopped until gale died out at 6 p. m. on the 2d.

On the 2d a Low appeared near latitude 55° N., longitude 25° W.; this moved rapidly eastward, accompanied by rain and hail, and on the 3d was central off the north coast of Scotland, reaching the North Sea on the 4th. The storm area was at its maximum on the 3d when it extended as far west as the 30th Meridian. Storm logs:

Dutch S. S. American:

Gale began on the 2d, wind WNW. Lowest barometer 29.50 inches at 2 p. m. on the 2d, wind NW., in latitude 55° 50' N., longitude 26° 41' W. End on the 3d, wind NW. Highest force of wind 10; shifts WNW.-NW.

British S. S. Canadian Leader:

Gale began on the 3d, wind SW. Lowest barometer 29.75 inches at 8 a. m. on the 3d, wind SW., 9, in latitude 51° 37' N., longitude 3° 57' W. End on the 4th, wind WNW. Highest force of wind 9; shifts 5 points.

On the 4th there was a moderate depression over the northern part of the Gulf of Mexico that moved northeastward, and on the 8th was over the Province of Quebec. The weather conditions along the American coast during the progress of this Low were not as a rule severe, although a few vessels west of the 65th meridian encountered moderate gales, as shown by following storm logs:

British S. S. Tuscarora:

Gale began on the 5th, wind N. Lowest barometer 29.83 inches at midnight on the 5th, wind N., 7, in latitude 37° 35' N., longitude 66° 40' W. End at 4 a. m. on the 6th, wind NE. Highest force of wind 8; shifts N-NNE-NE.

British S. S. Maravi:

Gale began on the 7th, wind W., 7. Lowest barometer 30.13 inches at 4 p. m. on the 7th, wind W., 7, in latitude 34° 10' N., longitude 71° 45' W. End on the 8th, wind W., 6. Highest force of wind 8, W.; no shifts, very high westerly sea.

On the 6th and 7th there was an area of high pressure over the northwestern part of the Gulf of Mexico, and on the former date vessels a short distance south of Brownsville, Tex., experienced a severe "norther" as shown by following storm log.

Honduran S. S. Yoro:

Gale began on the 6th, wind NNW. Lowest barometer 30.11 inches at 2 a. m. on the 6th, wind NW., 8, in latitude 20° 10' N., longitude 95° 28' W. End on the 7th, wind NW. Highest force of wind, 8; shifts NNW-NW.

From the 6th to 9th low pressure prevailed over the British Isles, and during that period vessels east of the 30th meridian encountered northerly to northwesterly gales. Storm log:

British S. S. Verentia:

Gale began on the 7th, wind NW. Lowest barometer 29.98 inches at 4 p. m. on the 7th, wind NNW., in latitude 49° 58' N., longitude 18° W. End on the 8th, wind NW. Highest force of wind 8, NW.; shifts NW-W-NNW.

On the 10th there was an area of low pressure in the vicinity of Bermuda; this drifted slowly northeastward and from the date of its first appearance until the 15th moderate to strong gales prevailed over part of the western section of the ocean, the storm area expanding and contracting from day to day. Storm logs:

American S. S. Commack:

Gale began on the 10th, wind variable. Lowest barometer 29.78 inches at 5 p. m. on the 10th, wind NW., 8, in latitude 31° 28' N., longitude 65° 42' W. End on the 11th, wind NW., 8; shifts not given.

French S. S. Leopold L. D.:

Gale began on the 12th, wind NE. Lowest barometer 29.91 inches at noon on the 13th, wind NE., 9, in latitude 41° 45' N., longitude 63° W. End on the 13th, wind NE. Highest force of wind 10; steady NE.

American S. S. Eastside:

Gale began on the 14th, wind E., 8. Lowest barometer 29.61 inches at 4 p. m. on the 14th, wind W., 5, in latitude 42° 22' N., longitude 53° 56' W. End on the 15th, wind NNE. Highest force of wind 10, ENE., shifts W-E-NE.

On the 10th and 11th moderate to strong northerly gales occurred off the coast of southern Europe, although the storm area appeared to be of limited extent. Storm log:

British S. S. Saxoleine:

Gale began on the 9th, wind N. Lowest barometer 29.78 inches at 8 a. m. on the 10th, wind N., 10, in latitude 44° 46' N., longitude 12° 24' W. End on the 12th, wind NE. Highest force of wind 10, NE.; shifts N-NE.

From the 12th to 17th low pressure prevailed in northern European waters, attended by heavy weather over the eastern section of the steamer lanes. Storm logs:

American S. S. Eastern Leader:

Gale began on the 12th, wind WNW. Lowest barometer 28.97 inches on the 14th, wind N., 2, in latitude 56° 20' N., longitude 24° 08' W. End on the 14th, wind NW. Highest force of wind 9; shifts not given.

British S. S. Boston City:

Gale began on the 12th, wind W. Lowest barometer 29.15 inches at 8 p. m. on the 14th, wind WNW., in latitude 50° 45' N., longitude 22° 45' W. End on the 16th, wind WNW. Highest force of wind 10, WNW.; shifts SW-W-WNW.

British S. S. Baltic:

Gale began on the 16th, wind W. Lowest barometer 29.94 inches at noon on the 16th, wind WNW., 8, in latitude 49° 43' N., longitude 27° 26' W. End on the 17th, wind WNW. Highest force of wind 9, WNW.; steady WNW.

On the 14th a moderate depression appeared near latitude 30° N., longitude 70° W.; it moved slowly northeastward and on the 15th was central a short distance east of Bermuda where a barometric reading of 29.56 inches was recorded. This disturbance was apparently

not especially severe in character, as the following was the only storm log received.

American S. S. West Norranus:

Gale began on the 14th, wind WSW. Lowest barometer 29.80 inches at 4 p. m. on the 14th, wind NW., in latitude 27° 57' N., longitude 71° 35' W. End on the 14th, wind NW. Highest force of wind 7; shifts WSW-NW.

On the 17th and 18th there was another disturbance near the Bermudas, and vessels to the westward of these islands encountered northerly to northwesterly gales, as shown by following storm log:

British S. S. Matura:

Gale began on the 17th, wind SSW. Lowest barometer 29.66 inches at 3:10 p. m. on the 17th, wind SSW., 9, in latitude 32° 43' N., longitude 70° W. End on the 18th, wind NNW. Highest force of wind 9; shifts SW-W. At 3 p. m. on the 17th we experienced a terrific squall from the SSW. with thunder, lightning, rain and hail following a regular deluge of rain, lasting altogether about 7 minutes. The hail unusually large, each ball being about $\frac{1}{4}$ inch in diameter. The wind backed from NW. to SSW. and every indication of bad weather. The first violent squall was followed by others of less force, with lulls between, and from 4:30 p. m. it set in to blow steadily, force 8, until about 2:30 a. m. on the 18th. The wind then shifted to WSW., the barometer rising gradually and the wind moderating.

On the 18th and 19th a deep depression surrounded Newfoundland, although no reports were received indicating unusually heavy winds.

On the 20th moderate northerly gales were reported off the coast of northern Europe, but no storm logs were received from vessels in that locality.

On the 21st and 22d there was a disturbance central near latitude 50° N., longitude 35° W., and on the latter date the storm area extended as far south as the 35th parallel. Storm logs:

German S. S. Bayern:

Gale began on the 21st, wind WNW., 7. Lowest barometer 29.62 inches at 3 p. m. on the 22d, wind NNW., 10, in latitude 46° 41' N., longitude 38° 36' W. End on the 22d, wind ENE. Highest force of wind 10, NNW.; shifts 4 points to east.

British S. S. Adra:

Gale began on the 22d, wind SSE. Lowest barometer 30.00 inches at 9:12 a. m. on the 23d, wind NNW., 9, in latitude 36° 09' N., longitude 41° 44' W. End on the 23d, wind NE. Highest force of wind 10, WNW.; shifts NNW-N.

Charts VIII to XI show the conditions from the 23d to 26th, inclusive, when unusual weather existed in the vicinity of the Azores, and heavy winds also prevailed over different sections of the ocean. Storm logs:

French S. S. Britannia:

Gale began on the 24th, wind NE. Lowest barometer 29.74 inches, wind NE. 7, at the Azores. End on the 26th, wind NNE. Highest force of wind 9; steady SE.

Dutch S. S. Prins der Nederlanden:

Gale began on the 24th, wind W. Lowest barometer 29.78 inches at 4 a. m. on the 25th, wind WSW., in latitude 32° 10' N., longitude 74° 15' W. End on the 25th, wind NW. Highest force of wind 8; shifts WSW-W-WNW-NW.

American S. S. Maiden Creek:

Gale began on the 24th, wind SE. Lowest barometer 29.93 inches on the 24th, wind SE., 8, in latitude 41° 45' N., longitude 56° 50' W. End on the 26th, wind SSE. Highest force of wind 9; steady SE.

On the 27th gales still prevailed over a limited area between the 40th and 50th parallels and the 20th and 35th meridians. Moderate weather was the rule over the remainder of the ocean, with the exception that one vessel near latitude 42° N., longitude 56° W., and another near latitude 34° N., longitude 50° W., reported southeasterly winds, force 8, although neither rendered

storm logs. By the 28th the storm area over the eastern section of the ocean had contracted materially, while heavy winds were encountered over a limited area in southern waters. Storm log:

American S. S. Gaffney:

Gale began on the 27th, wind SE. Lowest barometer 30.13, wind S., 7, in latitude 34° 10' N., longitude 50° 20' W. End on the 28th, wind S. Highest force of wind 8, SSE.; shifts 4 points.

The 29th and 30th were apparently the quietest days of the month, as practically all the reports received indicated moderate weather.

CYCLONIC DISTURBANCES IN THE SOUTH ATLANTIC OCEAN.

By ALBERT J. McCURDY, Jr.

Gales of short duration and limited extent prevailed off the Brazilian coast in the first and middle decades of November, as indicated by weather reports received from vessels traversing the southern shipping routes in that month.

The Italian S. S. *Belvedere*, Capt. G. Gladulich, Buenos Aires, toward Trieste, reports a moderate gale experienced in latitude 32° 22' S., longitude 51° 20' W., on the 4th. Third Officer I. L. Uich states that the lowest barometric reading observed was 751.5 mm. (29.59 inches), at 8:50 a. m., wind ESE., force 7.

On the same date the American S. S. *Bird City*, Capt. H. Petersen, observer, Mr. Martin Marys, Philadelphia toward Buenos Aires, experienced a strong southerly gale with rough seas. The lowest pressure, 29.79 inches (corrected), was observed at 6:30 p. m., in latitude 31° 41' S., longitude 51° 09' W. Gale ended on the 4th, wind SSW. Highest force, 9; shifts SE. to SW.

Moderate to strong gales swept the southern coast of Brazil on the 5th, involving the Belgian S. S. *Londonier*, Capt. F. Paret, Antwerp, bound for Montevideo. Mr. W. R. A. Ezechials, observer, states that at 4 p. m., while in latitude 20° 03' S., longitude 38° 58' W., the pressure dropped from 29.66 inches to 29.56 inches (corrected), wind varying from NE., force 4, to NNW., force 5, weather clear and cloudy. At 6 p. m. the vessel was apparently close to the center of the disturbance in latitude 20° 01' S., longitude 39° 06' W. At this time the lowest observed pressure was 29.47 inches (corrected), wind shifting from NW. to SW., reaching its maximum velocity of force 9, variable. During a very fierce electrical thunderstorm, followed by heavy continuous rain, the wind diminished to force 4 with a rising barometer.

On the 19th of November the Danish M. S. *California*, Capt. P. G. C. Pedersen, proceeding from Hull, England, toward Buenos Aires, experienced winds of gale force off the southern coast of Uruguay. Mr. J. L. Oster, observer, reports heavy seas and overcast weather. The lowest pressure, 29.31 inches (corrected), was observed at 4 p. m., in latitude 32° 20' S., longitude 50° 30' W., wind from SE. Highest force of wind 8, from S.; shifts SW., S., SE.

The Dutch S. S. *Waalwijk*, encountered this gale on the 18th while proceeding from Rio Grande do Sul to Montevideo, reporting conditions similar to those experienced by the *California*.

Occasional thick fog was reported by vessels on the 8th, 9th, and 19th off the southern coast of Brazil.